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ABSTRACT

THE APPROACH (A PROCEDURE FOR PATTERNING RESPONSES OF ADULTS AND CHILDREN) TECHNIQUE WAS USED TO CODE OBSERVATIONS OF BEHAVIOR AND SETTING IN THIS ECOLOGICAL STUDY OF ADULT-CHILD COGNITIVE COMMUNICATION PATTERNS. THE SUBJECTS OBSERVED WERE 32 CHILDREN WHO PROPORTIONATELY REPRESENTED EACH OF FOUR AGE GROUPS (1 YEAR, 2 YEARS, 3 YEARS, AND 4 YEARS) AND WHO WERE STRATIFIED FOR SEX, RACE, AND SOCIOECONOMIC STATUS. THE DATA RESULTING FROM THE APPROACH CODING PROVIDED A QUANTIFIED, FINELY-DETAILED DESCRIPTION OF BEHAVIORAL EVENTS AND THEIR ENVIRONMENTAL FRAMEWORK. THE MAJOR FINDINGS WERE: (1) THERE IS A SIGNIFICANT SHIFT IN THE SOCIAL SETTING AT AGE 3 FROM ADULT AND CHILD ALONE TO ADULT TEACHING A GROUP OF CHILDREN, (2) THE OBJECT OF A CHILD'S COMMUNICATION VARIES WITH THE SOCIAL SETTING, (3) MORE THAN 2/3 OF ADULT BEHAVIOR PREDICATES EMITTED TO CHILDREN ARE VERBAL, (4) TOTAL FREQUENCY OF ADULT COGNITIVE INQUIRING AND INFORMING BEHAVIOR EMITTED TO A CHILD REMAINS HIGH AND CONSTANT TO CHILDREN IN ALL AGE GROUPS, (5) ADULTS SHIFT FROM MOSTLY INFORMING TO MOSTLY INQUIRING AS CHILDREN GROW OLDER AND (6) THE ADULT USES SHOWING ON DEMONSTRATION TO THE CHILD-ALONE LESS FREQUENTLY AS THE CHILD GROWS OLDER. (MH)

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OBSERVED COGNITIVE COMMUNICATION PATTERNS OF ADULTS & CHILDREN IN FOUR PRE-SCHOOL AGE GROUPS

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INTRODUCTION

Ecological investigation, as Herbert Wright has remarked (1967) "has to be defined by its objective: by the purpose of revealing the naturally given habitat and behavior of the individual." Naturalistic observation techniques meet the normative, idiographic, and systematic objectives of psychological investigations. They are particularly suited for the study of the communications patterns of very young children in group settings. The dearth of highly reliable test-assessment measures as well as a paucity of knowledge about classroom behaviors and interactions for infants and toddlers also makes ecological investigation particularly appropriate for discrimination of the person and setting variables relevant for designing intervention programs for children at these ages.

Several ecological investigatory tools have been developed and utilized for the description of social interactions. Barker and Wright's Midwest and its Children (1955) is perhaps the most famous for describing the ecology of a small town. Bobbitt, et al (1969) have investigated the dynamics of sequential mother and infant interactions among monkeys. Wimberger and Kogan (1968) have undertaken sequential analysis of dyadic (mother-child) interaction styles. Flanders (1963) has concentrated his interaction analysis on teacher and classroom behaviors.

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The APPROACH system was developed under Children's Bureau Grant No. MH07649. Further data collection and analysis has been carried out with Grants No. 1620. 1567 and 1620. 1623.

METHOD

At the Children's Center in Syracuse, N.Y. we have developed a technique; APPROACH - A Procedure for Patterning Responses of Adults and Children, (Caldwell et al. 1967) for coding observations of behavior and of the setting in which the behavior is emitted. The code is applied to a behavior record obtained by stationing an observer near the subject to be observed and having the observer whisper into a tape recorder every change in behavior noted in the subject and every response directed toward the subject or emitted within his social range. Coding is then done either directly from the tape or from a typescript of the behavior record.

Emitted behaviors are coded by breaking up the narrative description into behavioral clauses, each of which contains four basic components: the subject of the clause (who or what does something), the predicate (what is done), the object (toward whom or what the action is directed), and some qualifier (adverbial descriptions of the action). Each of those four components is then translated into a numerical code and grouped into a five digit statement (two digits being required for the predicates) which summarizes the subject-predicate-object-adverb involved in a single behavior unit. Table 1 summarizes all of the numerical codes for these components. The complete chain of numerical statements is then key punched for computer analysis. Behavior settings are also converted to numerical statements describing the type of activity taking place in the observational environment, the geographic region in which the behavior occurs, and the dramatis personae of the total social scene. Table II specifies the APPROACH setting codes.

This type of code permits a running sequential picture of actions emitted by the central figure of the observation and of behaviors received by him.

METHOD (cont'd)

In general the resulting description is a very fine-grained one containing much that might be considered irrelevant for some types of behavior analysis but at the same time rich in the sort of sequential data essential for true ecological analyses.

To date only a small coterie of persons is trained in the coding. Independent coding is permitted when a person achieves a level of reliability with an experienced coder of approximately .60 for all five digits, .90 for the subject and object, .80 for the predicate, and .75 for the adverbs.

SUBJECT SAMPLE

The group from which the present ecological analyses were made consists of 32 children, representing each of four age groups (1 year olds, 2 year olds, 3 year olds, and 4 year olds) drawn from two nursery school programs. Boys and girls, white and non-white, as well as middle socioeconomic class and lower socioeconomic class are equally represented in the sample.

Twenty minutes of continuous sequential observations were obtained for each child as central figure during <u>each</u> of two activity settings: 1. <u>structured learning time</u> and 2. <u>unstructured or free-play</u>. The present discussion will be concerned primarily with an examination of adult and child cognitive behaviors, (the information-processing predicates 10 through 19 in Table 1) as a function of child age and social situation (that is child-alone or as group-member) and as a function of structured or free-play classroom setting.

DATA ANALYSIS

Our data suggest that a child's presence in a group offers to him a bonus in terms of increased opportunity to receive adult teaching, demonstrating, inquiring, and conversing, as well as other cognitive components of the information processing predicates.

DATA ANALYSIS (cont'd)

This benefit of group membership is particularly high for such activities as story reading. The child at each age in the APPROACH sample described here is read to almost entirely as a member of a group. This is partly an artifact of the sampling conditions, which represent only morning activities. Sampling over the entire school day would have uncovered more of the reading of adult-to-child alone which occurs as classes thin out toward the end of the day.

In the three and four year old groups, twice as many of the inquiring-informing codes (16, 17, 18) are emitted by an adult to a child-as-group-member rather than to a child alone as in the 1 and 2 year old groups. Table III reveals that the Chi-Square for these age differences in the social setting for adult cognitive inputs is significant beyond the .05 level.

Figure #1 shows the percent increase in group-directed cognitive communications from an adult for the 4 age groups. The major shift in social-group patterns of reception by the child of such adult cognitive communications occurs in our sample for the three-year group.

When we compare code frequencies concerned with the elicitation and provision of information (predicates 16, 17, 18) which are received by a child directly from an adult with those he receives by birture of group membership, the ratio is about 3 to 1, for the children of both the 1-year-old and 2-year-old groups. This ratio reverses at three years; here we find a ratio of almost 2-1 in favor of adult inquiries and information provided to the group of which the central figure is a member, compared to such adult provision to the child alone. Among the 4's the frequencies of such emitted adult codes are distributed equally for both group and alone conditions.

DATA ANALYSIS (cont'd)

A two-way analysis of variance (done separately for structured versus free-play settings) of the adult-emitted inquiring informing predicates (16, 17, 18) as a function of child age and of social situation (groups vs. alone) confirms the significance of this decrease in cognitive input to the child alone during structured activity. (F significant beyond the .01 level.)

This decrease contrasts with the lack of any such significant change with age during free-play situations. These cognitive predicates are then distributed by the adult equally to the child alone or to a group of which the child is at that moment a member. Thus, when an adult programs verbal cognitive inputs he or she structures a group setting for such inputs increasingly as the child grows older.

It is interesting to note that the total frequency of these particular cognitive communications received by the child from an adult is relatively stable over all four age groups. The frequencies for age groups 1,2,3, and 4 respectively are 355, 412, 395, and 441. It is the situation of occurence of such adult communications which changes with age during structured learning times. There is also high stability in the percent of adult verbalization to children for the four age groups. Table 6 indicates that about 70% of all adult behavioral predicates emitted to children of each age group have a verbal component. Such stability of adult inputs independent of child age provides reassuring confirmation of teacher efforts to shape a child's verbal and cognitive environment regardless of a child's level of emission of general verbal or specifically cognitive communications.

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With increasing age of child our data in Fig. 2 indicate a significant transition in the conditions of adult delivery of all information-processing predicates (10-19 in Table 1). These information-processing predicates from an adult decrease significantly as a function of age to a child alone during structured activity (F significant beyond the .01 level). The respective frequencies for age groups 1,2,3, and 4 are 492, 483, 247, and 280. More and more, then, with increasing age child teacher-initiated learning times involve input to a group of which the child is a member rather than to an individual in a one-to-one teaching situation. The three year old group marks the age at which this change-over in adult setting-style-for-teaching occurs to an appreciable extent for information-processing predicates as a whole.

The patterning of adult-emitted information-processing changes significantly with increase in child's age. When we examine the distribution of the different kinds of cognitive communications provided to the children we note that the use by an adult of the informing or explaining mode (predicates 17 and 18) as a function of age level, decreases. The overall decrease across social settings declines from 32% in the one year group to 25% in the four year group.

Conversely, there is a rise with increasing age in the use of inquiries (predicate 16) by the adult from 17 per cent in the one-year-group to 38 per cent among the four's. This increase in what we might call more Socratic teaching methods occurs both to the child alone and to the group inclusive of the child. Marion Blank (1968) has suggested that Socratic dialogue be employed in preference to didactic teaching in order to develop abstract thinking in disadvantaged preschool children. It is encouraging to note that such a methodological preference is already expressed by our teachers in the older age groups.

Table IV examines the relative use of both teaching methods for children in the three younger groups compared to the 4 year old group. The four year old children actually receive more inquiring than informing codes (219 to 150) under both social conditions. This pattern differs from that received by the 1,2, & 3 year olds, with Chi-Square significant at the .05 level.

Thus, adult teaching techniques as well as setting-styles-for-teaching change as a function of increasing age of child. Such changes may be viewed as (1) indices of teacher responsivity to developmental advances which permit variation in complexity and variety of adult input. They may also be considered (2) as pacers which are offered by an adult to the older preschool children to stimulate such advances.

Demonstrating or showing (predicate 11 in Table I) as a teaching technique is emitted significantly less frequently to a child alone during structured activities with increasing age of child. (F is significant beyond the .01 level). Since the frequency of such "pointing out" by an adult does not change significantly with age during the free-play situation, we might speculate that teacher puts more stress on the "tell" portion of her planned "show and tell" time as a child grows older and becomes more skilled at decoding adult purely-verbal rather than primarily-gestural cognitive communications.

Contrary to these changing patterns of adult-to-child communications, where cognitive inquiry or teaching is the crux of the adult input, no changes are revealed by the analysis of variance in the frequency of other techniques of adult communications, particularly in the frequencies of low-level conversing (predicate 12) as a function of age or group membership.

The APPROACH analysis for this group of children also highlights the overwhelming importance of the adult for cognitive input during the first three years of life. In Figure 2, we see that for the 1- and 2 year old groups. 97 percent of the total of all information-processing codes received by a child come from an adult. Among the 3's, this percent is till very high: 90 percent; in the 4 year group: 70 percent comes from an adult.

A similar patterning of the crucial significance of the adult as provider of cognitive input appears if we look at the separate predicates of information-processing received by the child. Figure 3 graphs the percentage of demonstration by others to child in both social situations (alone and group). Demonstration, or gestural showing, comes almost 100 percent from an adult during the first three years of life. Only in the 4-year age group do we find the adult contribution drops to 69 percent; at this age demonstrations by other children appear to an appreciable (25 percent) extent.

Figure 4 plots the relative contributions by others to the provision of vocalization or talk to a child (predicate 12). This simple talking comes almost entirely from adults during the first year. Such conversations, remarks, or vocalizations are rapidly provided to a child by his peers with increasing age: 17 percent from the 2's, 30 percent from the 3's, 45 percent from the 4's. Yet, the adult remains the source of 50 percent of such low-level verbal communications even at the 4-year age level.

For the inquiring-informing predicates (16, 17, 18) this adult contribution is even more dramatic. We see looking again at Figure 1) that it remains near 100 percent for the first two years, drops to 90 percent for the group of three-year-olds, and still accounts for 84 percent of such verbal-cognitive codes delivered to the 4-year-old.

Thus, these data give eloquent support to those who plead the necessity for high teacher-child ratios in early environmental enrichment programs.

We can examine this premise in another way. Analysis of variance of the distribution by the central figure of all the information-processing predicates to others reveals, as we should expect, a significant increase in these communications to another boy or girl as a function of age level. This F is significant at the .05 level during structured activity and at the .001 level during unstructured activity. However, in contrast to all these increments in information-processing predicates emitted by a child to other children singly or in groups, the analysis of variance reveals no change in the frequency of all information-processing predicates addressed to adults as a function of age or structured setting or sex of child. Thus, the adult continues to be an important focus of the child's cognitive communications over all age groups.

We have discussed earlier the fact of an increased use of group-teaching arrangements with age during structured activities. This group setting affords the child an opportunity to increase his emission of all information-processing predicates (the 10's) to peers-in-a-group, as well as to individuals. An analysis of variance for these information-processing codes shows a significant increase in the frequencies emitted to peer-members-as-a-group with increasing age of child. That is, an F ratio significant beyond the .01 level during structured, but not during unstructured activity, provides evidence of the child's utilization of this available teacher-initiated opportunity. Thus, the object or objects of a child's communications vary as a function of the setting in which the behavior occurs.

The patterns of the [illegible]drens' cognitive communications to adults shift with age in the frequency of all information-processing predicates addressed to adults.

Figure 5 analyzes the change in inquiring-informing codes (16, 17, 18) emitted by a child to others as a function of age group. The 2 and 3-year-olds emit almost twice as many of these codes to an adult as do the 1-year-olds. The frequency of predicates 16, 17, 18 from the 4-year-olds to an adult is almost three times that of the 1-year-olds.

Despite a total increase in the actual frequencies of such output with age, approximately two-thirds of a child's inquiring and informing codes are directed to an adult. Incidentally, these codes were also analyzed on the basis of sex and group setting. An F significant at the .05 level indicated variation of these predicate frequencies as a function of sex. Girls were inquiring of or informing an adult equally as much as boys in the 3-year group, but more than boys in the 2 and 4 year groups. Therefore, a tentative hypothesis that in general, with increasing age, more girls than boys emit verbal information-processing types of communications to an adult seems tenable from the present data.

Figure 6 shows nicely the changes in patterns of information-processing communications emitted by the different age groups. The percent of information-processing codes directed by the child to an adult is relatively stable over age. The increase in percent of such output to other children, either singly or in groups, is vividly evident in the fan-shaped wedge of such increment which appears as we scan the groups from 1 to 4 years. The percent of information-processing communications of <u>all</u> types directed to <u>another child</u> increases from 3 per cent among the 1's, to 7 per cent among the 2's, to 22 percent among the 3's, to 35 per cent among the 4-year olds.

Figure 7 shows clearly that: most of this increment (about 2/3 of it) is accounted for by increases in the simple-communicating or vocalizing predicate (12) emitted by a child to another child. Respectively, the percents of predicate 12 emitted to another child are: 1 per cent in the 1-year-old group, 9 per cent in the 2 year old group, 25 per cent in the 3 year old group, 44 per cent in the 4-year-old group. The percents of inquiring-informing codes (16, 17, 18) emitted by a child to another child are: 0 per cent among the 1 year olds, 6 per cent among the 2's, 19 per cent among the 3's, and 29 per cent among the 4's. What is immediately noticeable in Figure 6 and 7 is the proportional decrease in egocentric, or self-directed, verbal communications as a function of increasing age. Across the 4 age groups, the actual frequency of such egocentric verbal communications does not decline much. But self directed verbal communications assume a proportionately smaller place in the child's communication repertoire as he grows older. 40 per cent of the one-year old information-processing communications are vocalizations to the self. By four years of age, only 20 per cent of the child's information-processing predicates are communications emitted exclusively to the self. Thus, the data indicate significant changes in the objects of cognitive communications as a function of age. Piaget's thesis in Language & Thought of the Child was that the predominant activity in early utterances is the assimilation of the environment to the child's schemas. Whether planned early enrichment programs can quite possibly change the balance of Piagetian "constancies" in the proportion of egocentric language in the pre-school child or simply change the objects of such monologues is an experimental question which ecological methods are well suited to explore.

CONCLUSIONS

The major findings of this ecological investigation are:

1. For the two nursery schools examined, there is a significant shift in the social setting from dyadic (adult-child alone) to peer group (inclusive of child) in which structured teaching by an adult occurs. The shift is prominent by three years of age.

2. The objects of a child's communications vary as a function of the social setting in which the behavior occurs.

3. Adult verbal behaviors account for more than 2/3 of total adult behavioral predicates emitted to a child for all four age groups.

4. The total frequency of adult cognitive inquiring and informing predicates emitted to a child remains high and fairly constant over all 4 age levels.

5. There is a significant change with age of child during structured settings in the proportions of different kinds of information processing predicates that an adult emits to a child in a nursery school setting. Adult informing is predominant over inquiry for the children in groups of 1's, 2's, and 3 year olds. A more Socratic emphasis on the use of inquiry by the adult is evidenced in the 4 year old group.

6. The older the pre-school child, the less frequently does the adult use showing or demonstration to the child-alone as an information-processing communication in a structured learning situation.

CONCLUSIONS (cont'd)

7. The child in each succeeding pre-school age group emits significantly more information-processing predicates of all kinds to another child.

8. Most of this increase is in the simple-talking or communicating predicate. However, a significant portion of the increase to other children is in the verbal-cognitive communication predicates.

9. The frequencies of self-directed vocalizations and verbal communications remain constant over the 4 age groups observed. However the proportion that such egocentric communications represent of the total of all information-processing predicates emitted by the preschool child is halved among the 4 year olds compared to its proportion among the 1 year olds.

10. The adult continues to be an important focus of a majority of the child's verbal-cognitive communications for all 4 age groups.

SUMMARY

Early childhood environmental enrichment programs are now being planned increasingly as one kind of solution to problems of the urban and rural disadvantaged.

The course of such programs must be steered between the steep shores of too-high hopes given our lack of experience in such societal engineering and the perils of excessive reliance on individual tests and measurements which are not always applicable or appropriate to the very young child. Careful ecological soundings can make our course less hazardous as well as less haphazard to chart.

SUMMARY (cont'd)

Ecological data on adult behavior styles for teaching for social interaction and other data on the environmental settings which are maximally effective in stimulating infants and toddlers can be utilized to modify more realistically our expectations about the influence of cognitive enrichment programs on very young children and can aid in the development of specific programming procedures to ensure the efficacy of such influences.

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Table 1. Summary of the major APPROACH Behavior Categories and the numbers assigned each in the code.

BEHAVIORS

I. Subject of Behavioral Clause (1st digit)

0 Central figure (CF)
1 The environment
2 Female adult
3 Female child
4 Item
5 Male child
6 Group, including CF
7 Group, excluding CF
8 Male adult
9 Setting alert

II. Behavioral Predicates (2nd and 3rd digits)

Environmental Contact (00-09)
00 Ignores
01 Attends
02 Establishes or maintains contact
03 Terminates contact
04 Scans

Information Processing (10-19)
10 Confirms
11 Shows (to) or demonstrates (for)
12 Communicates or converses
13 Writes or draws (for)
14 Reads (to)
15 Corrects or disconfirms
16 Inquires
17 Informs or teaches
18 Informs about culture
19 Dramatizes (for)

Food Behavior (20-24)
20 Gives food (to)
21 Takes or handles food
22 Takes or manipulates food
23 Transports food (to)
24 Disorganizes with food

Manual Activities (25-29)
25 Transfers item(to or toward)
26 Takes(from)or handles item
27 Manipulates item
28 Transports item (to)
29 Throws or rolls item (to)

Negative Reinforcement (30-39)
30 Withholds sanction (from)
31 Shows discomfort
32 Expresses displeasure (to)
33 Criticizes or derogates
34 Expresses hostility
35 Interferes or restricts
36 Resists or rejects
37 Threatens or frightens
38 Assaults

Positive Reinforcement (40-49)
40 Permits or sanctions
41 Expresses solicitude
42 Shows pleasure
43 Approves, encourages
44 Expresses affection
45 Facilitates
46 Excuses
47 Bargains, promises
48 Protects, defends

Body Activities (50-59)
50 Increases or accelerates
51 Decreases or retards activity
52 Perioralizes
53 Acts in situ
54 Adjusts or accommodates
55 Provides kinesthetic stimulation
56 Locomotes (toward)
57 LMA's
58 Marches, dances or rhythmicizes
59 Voids or excretes

Miscellaneous (60-69)
60 Acts or occurs
61 Caretakes
62 Consummates activity
63 Consummates activity, failure
64 Disorganizes
65 Disintegrates emotionally
66 Makes music (with)

Control Techniques (70-79)
70 Suggests
71 Request
72 Inhibits
73 Forbids
74 Offers

III. Object of Behavioral Clause (4th digit)

0-8 Same as for 1st digit
9 No information

IV. Supplementary Information (5th digit)

0 Ineptly
1 Accompanied by verbalization(or with sound if subject is 1 or 4)

Supplementary Information (cont'd)

2 Involving interpersonal physical contact
3 With intensity
4 In a specified manner, place or time
5 In a manner, place or time other than that specified
6 Imitatively
7 In continuation
8 Complexly
9 No information

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Table 2. Summary of the major Setting Categories and the numbers assigned each in the code.

SETTINGS

I. Setting alert (1st digit)

9 Setting code

II. Activity Identification (2nd and 3rd digits)

00 Lunch or snack
01 Pre-nap or nap
02 Diapering or toileting or associated dressing or undressing
03 Free or unstructured activity
04 Structured learning time
05 Book or story
06 Record, music
07 Art, cutting, pasting
08 Gym or outdoor play
09 Transition times
10 Medical or psychological exam(or treatment)
11 Assembly or program
12 ACI, free
13 ACI, structured
14 Perpetual motor exercises
15 Field trip
20 Other

III. Geographic Region (4th digit)

1 School
2 Home
3 Laboratory
4 Special teaching area
5 Other

IV. Supporting Cast (5th digit)

0 Child alone
1 Mother present
2 Father present
3 Mother and father present
4 One other child present
5 More than one other child present
6 Non-family adult
7 Non-family adult or adults and child or children
8 One or both parents plus other adult, with or without other children
9 Other

TABLE 3

Amount of Inquiring and Informing From Adults

To Child-Alone Compared to Child-in-Group

	No. of children who received more as individuals	No. of children who received more as part of a group
Children under 3 years	15	1
Children over 3 years	9	7

N = 32

df = ($x^2_{critical}$ = 3.84 at p=.05 level)

x^2 = 4.17 *

TABLE 4

Amount of Inquiry vs. Amount of Informing that Children of Two Age Groupings Receive from Adults in 2 Child Care Centers

	More Inquiring	More Informing	Total
Children 1, 2 & 3 yrs.	4	20	24
Children Age 4 yrs.	5	3	8
	9	23	32

$x^2 = 4.17$ *

df = 1

N = 32

TABLE 5

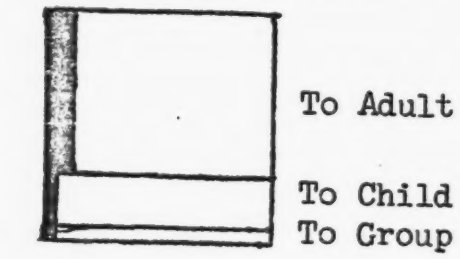
Adult Inquiring vs. Informing to Child-Alone and Child-in-Group in Actual Frequencies and as Percent of Total Adult Information Processing Predicates Directed Towards Child.

	Inquiring	Informing
One's	(17.3%) 124	(31.7%) 226
Two's	(23.7%) 164	(32.1%) 232
Three's	(22.9%) 162	(27.4%) 193
Four's	(38.0%) 219	(25.5%) 147

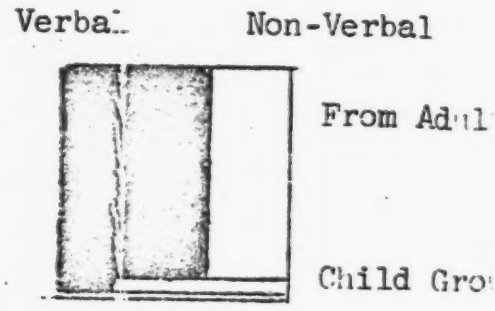
TABLE 6

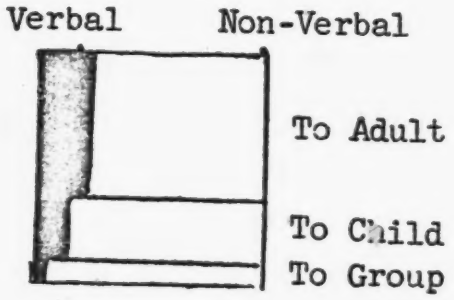
PERCENTAGE OF VERBAL AND NON-VERBAL BEHAVIOR EMITTED AND RECEIVED BY 32 CHILDREN AT TWO CHILD CARE CENTERS

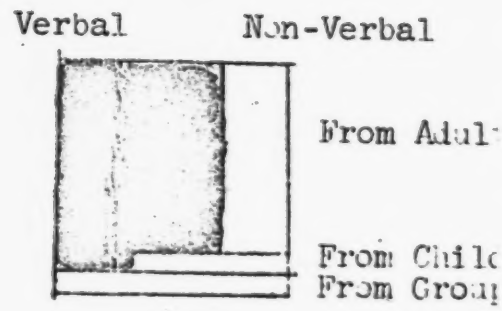
Child to Adult

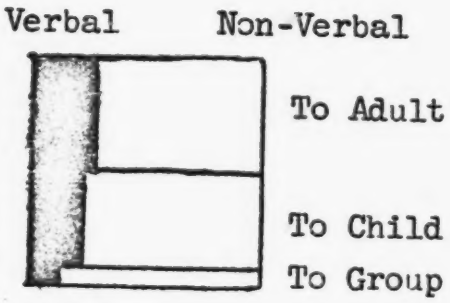


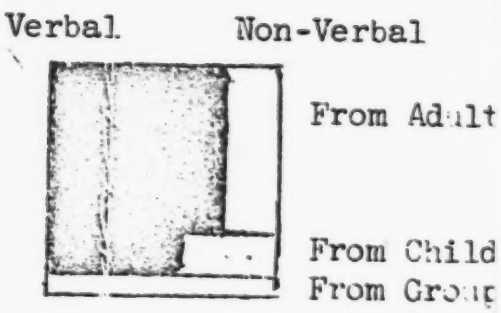
Adult to Child

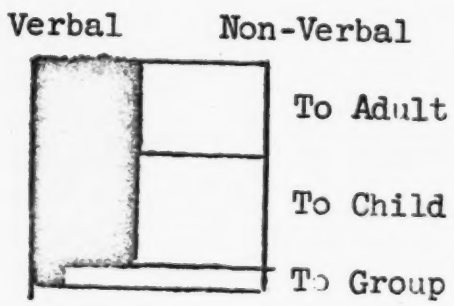


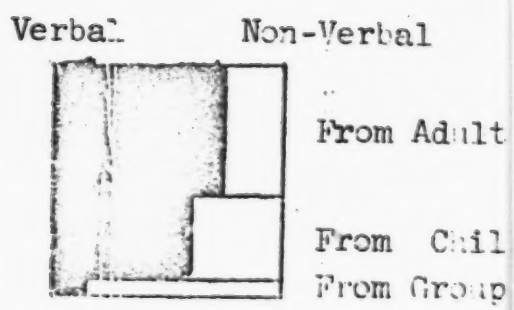












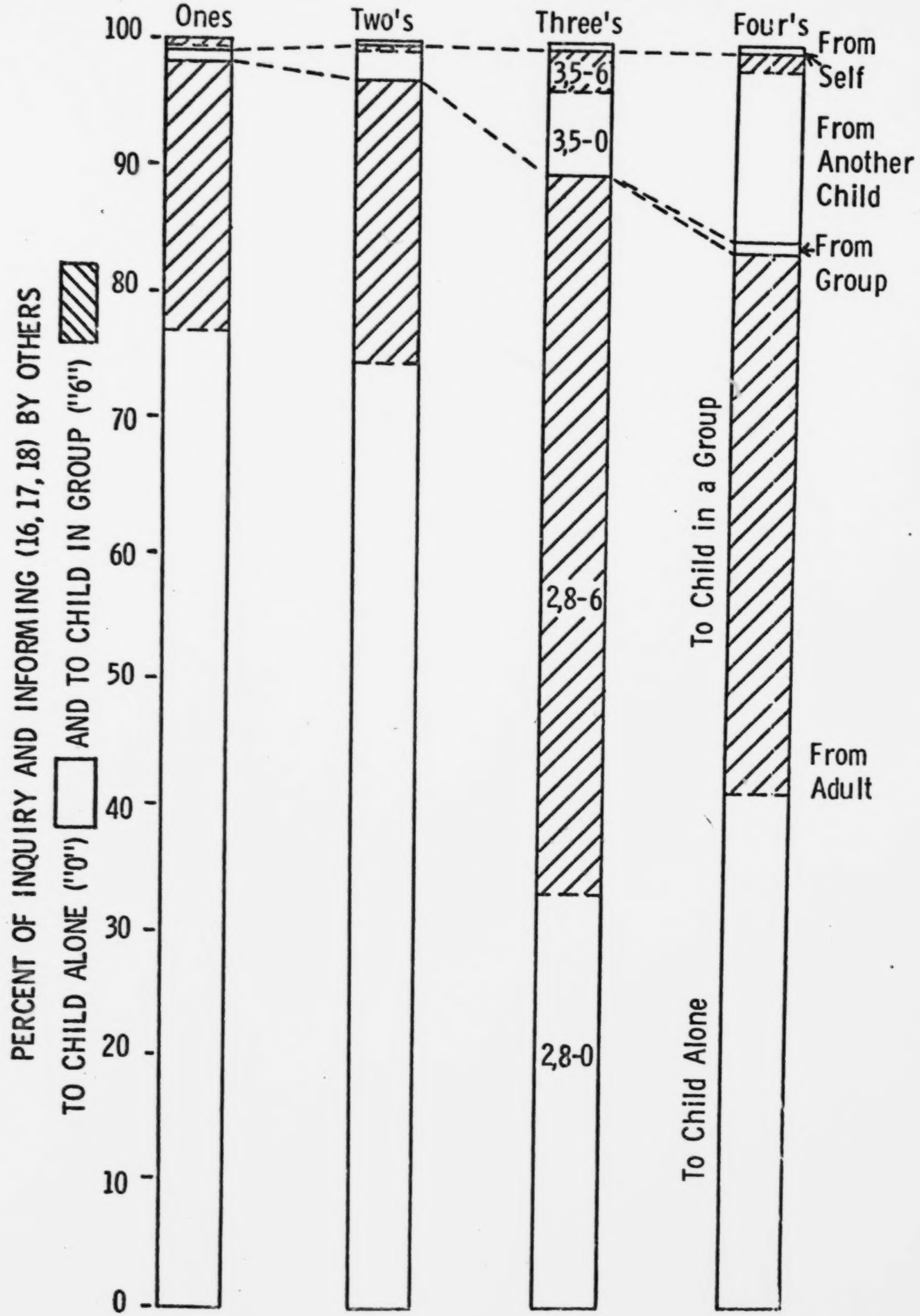

Ones
Two's
Three's
Four's
100
90
80
70
60
50
40
30
20
10
0
PERCENT OF INQUIRY AND INFORMING (16, 17, 18) BY OTHERS
TO CHILD ALONE ("0") AND TO CHILD IN GROUP ("6")
3,5-6
3,5-0
2,8-6
2,8-0
From Self
From Another Child
From Group
From Adult
To Child in a Group
To Child Alone

Figure 1

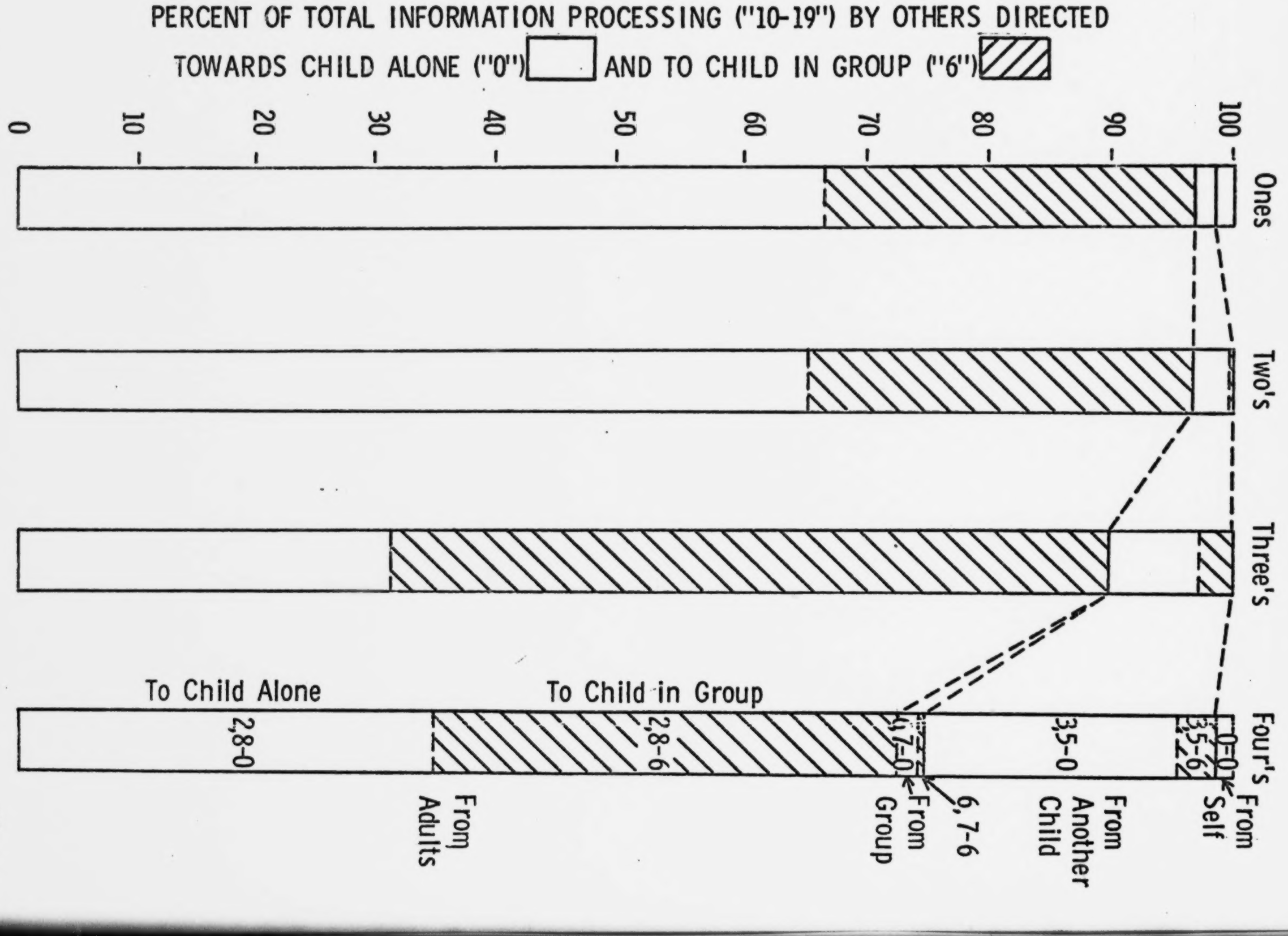

PERCENT OF TOTAL INFORMATION PROCESSING ("10-19") BY OTHERS DIRECTED
TOWARDS CHILD ALONE ("0")
AND TO CHILD IN GROUP ("6")
0
10
20
30
40
50
60
70
80
90
100
Ones
Two's
Three's
Four's
To Child Alone
To Child in Group
2,8-0
2,8-6
4,7-0
3,5-0
3,5-6
0=0
From Adults
From Group
6, 7-6
From Another Child
From Self

Figure 2

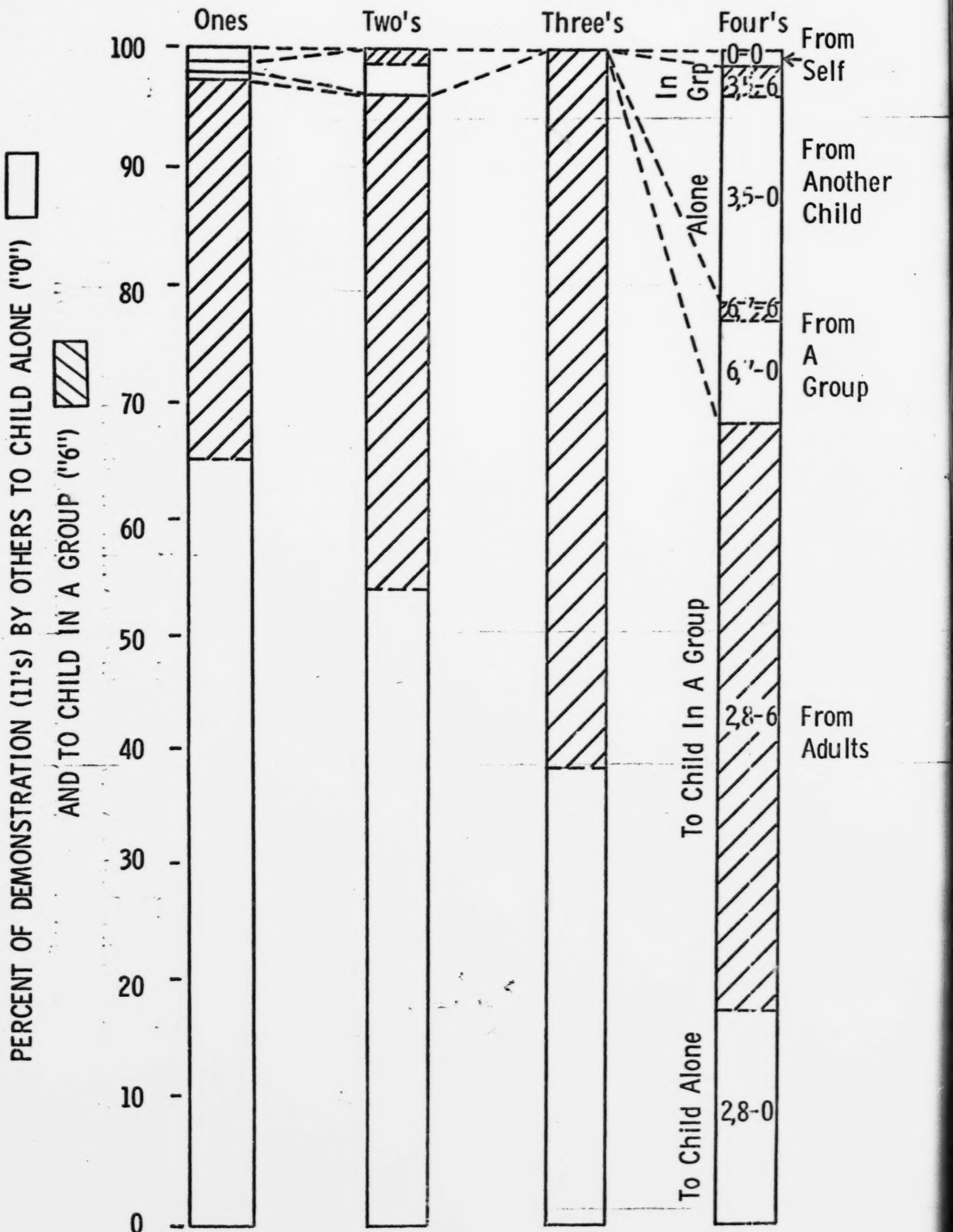

Ones
Two's
Three's
Four's
100
90
80
70
60
50
40
30
20
10
0
PERCENT OF DEMONSTRATION (11's) BY OTHERS TO CHILD ALONE ("0")
AND TO CHILD IN A GROUP ("6")
In Grp
Alone
0-0
From Self
3,5-6
3,5-0
From Another Child
2,8-6
6,1-6
2,8-0
6,1-0
From A Group
2,8-6
From Adults
To Child In A Group
To Child Alone
2,8-0

Figure 3

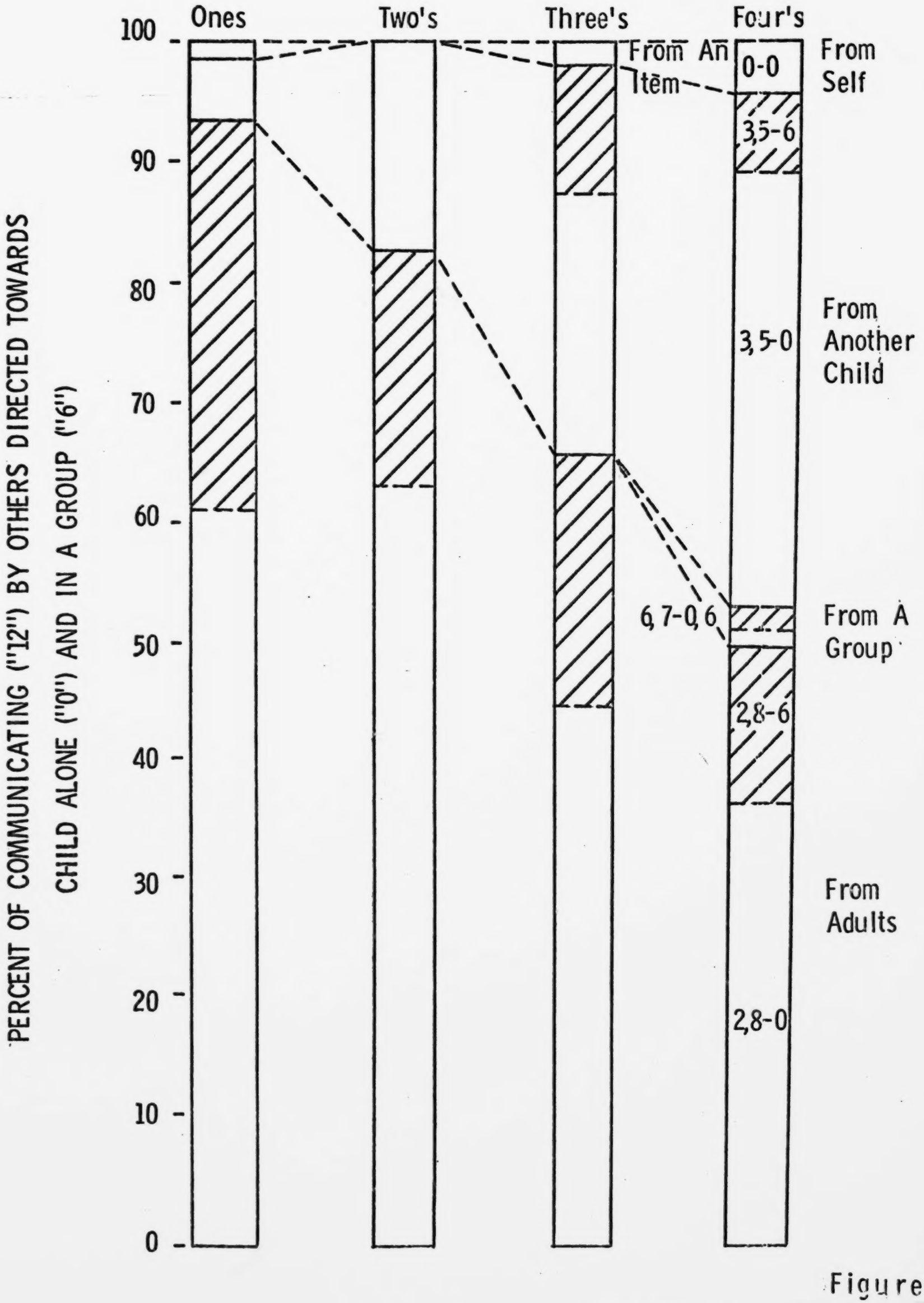

PERCENT OF COMMUNICATING ("12") BY OTHERS DIRECTED TOWARDS CHILD ALONE ("0") AND IN A GROUP ("6")
100
90
80
70
60
50
40
30
20
10
0
Ones
Two's
Three's
Four's
From An Item
From Self
From Another Child
From A Group
From Adults
0-0
3,5-6
3,5-0
6,7-0,6
2,8-6
2,8-0

Figure 4

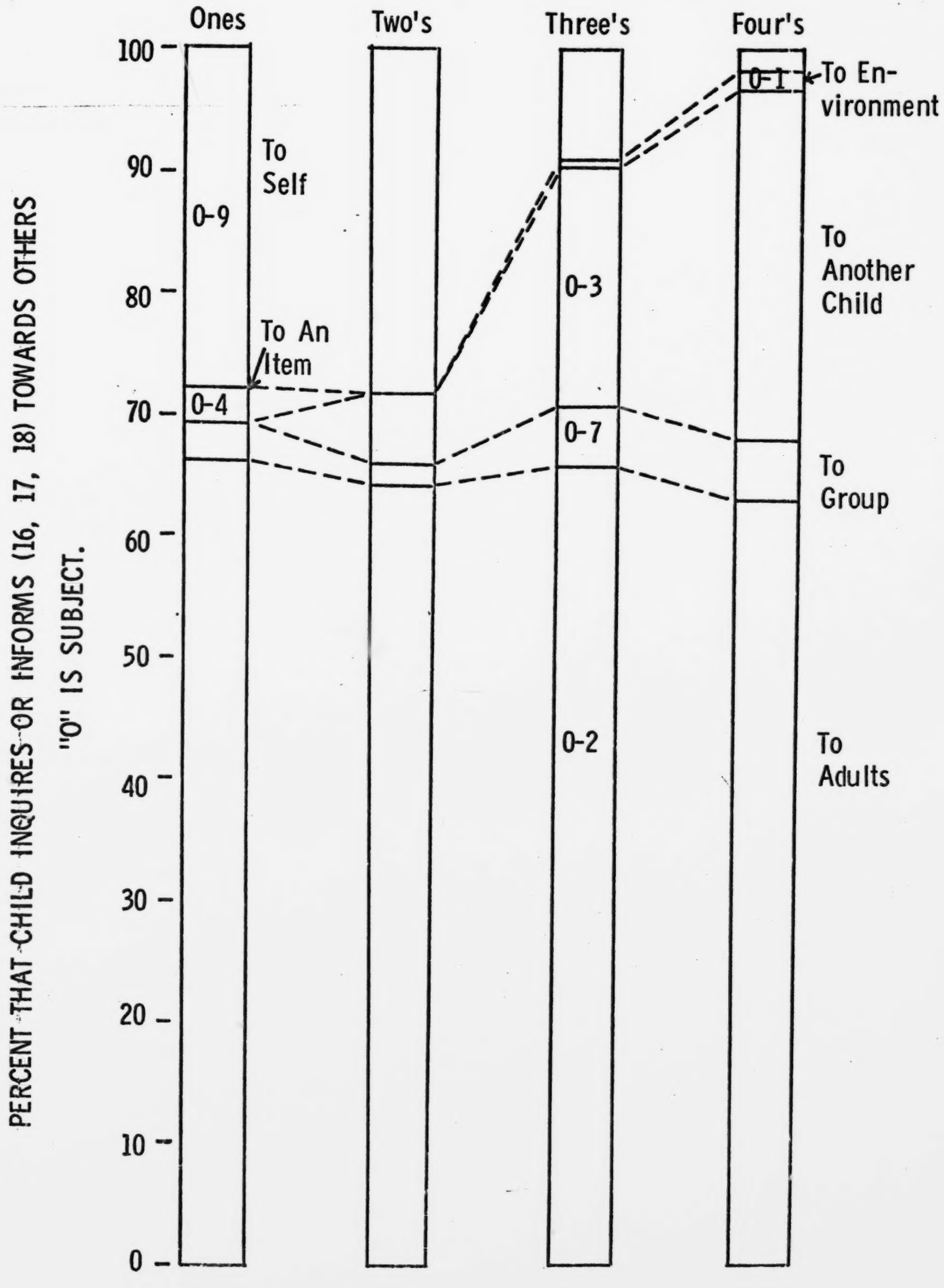
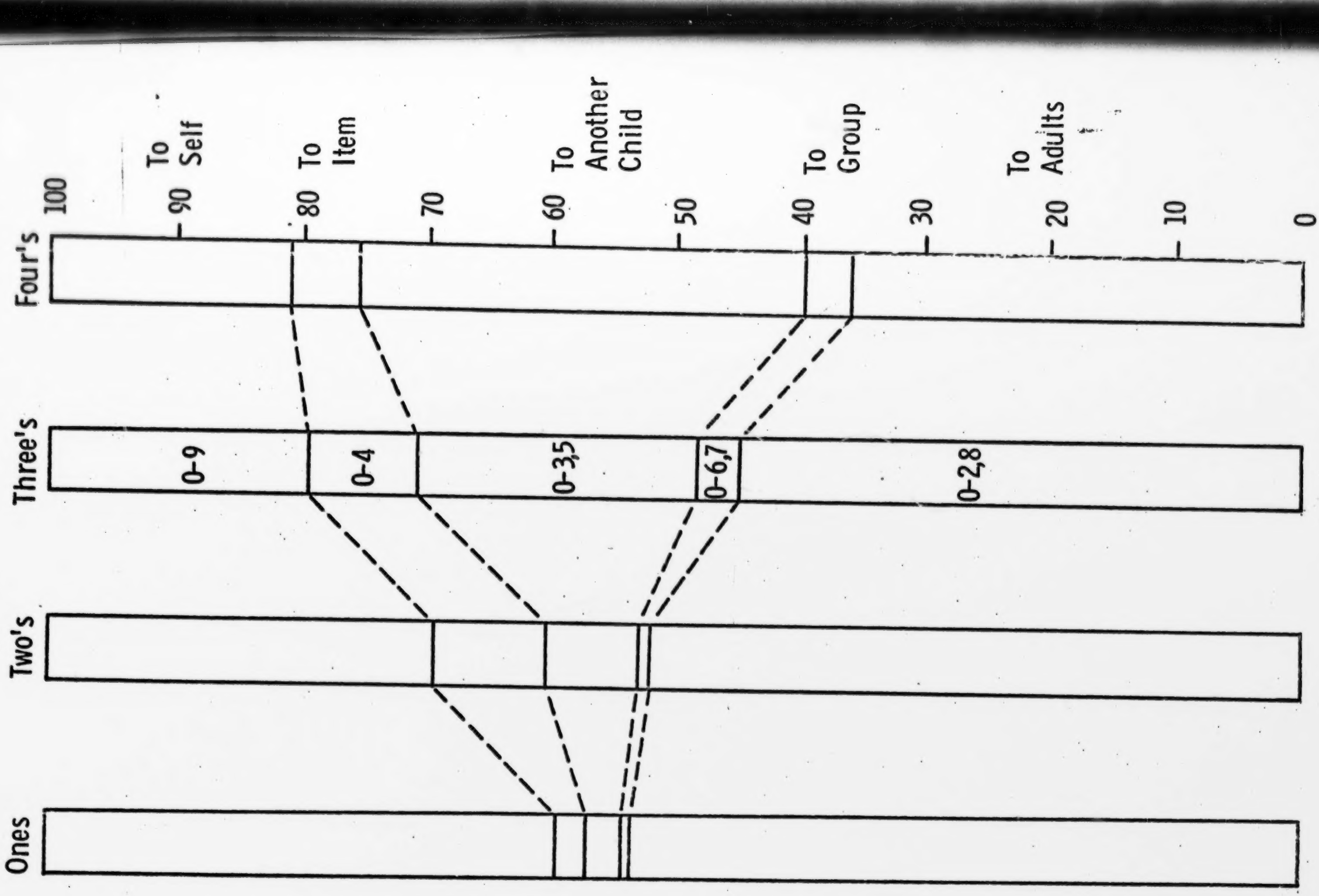

PERCENT THAT CHILD INQUIRES OR INFORMS (16, 17, 18) TOWARDS OTHERS
"0" IS SUBJECT.
100
90
80
70
60
50
40
30
20
10
0
Ones
Two's
Three's
Four's
0-9
0-4
0-3
0-7
0-2
0-1
To Self
To An Item
To Environment
To Another Child
To Group
To Adults

Figure 5



Figure

PERCENT OF TOTAL INFORMATION PROCESSING (10-19) DIRECTED TO OTHERS BY CHILD. SUBJECT IS "0".

PERCENT THAT CHILD (0) COMMUNICATES (12) TO OTHERS (6 Groups)
"0" IS SUBJECT.

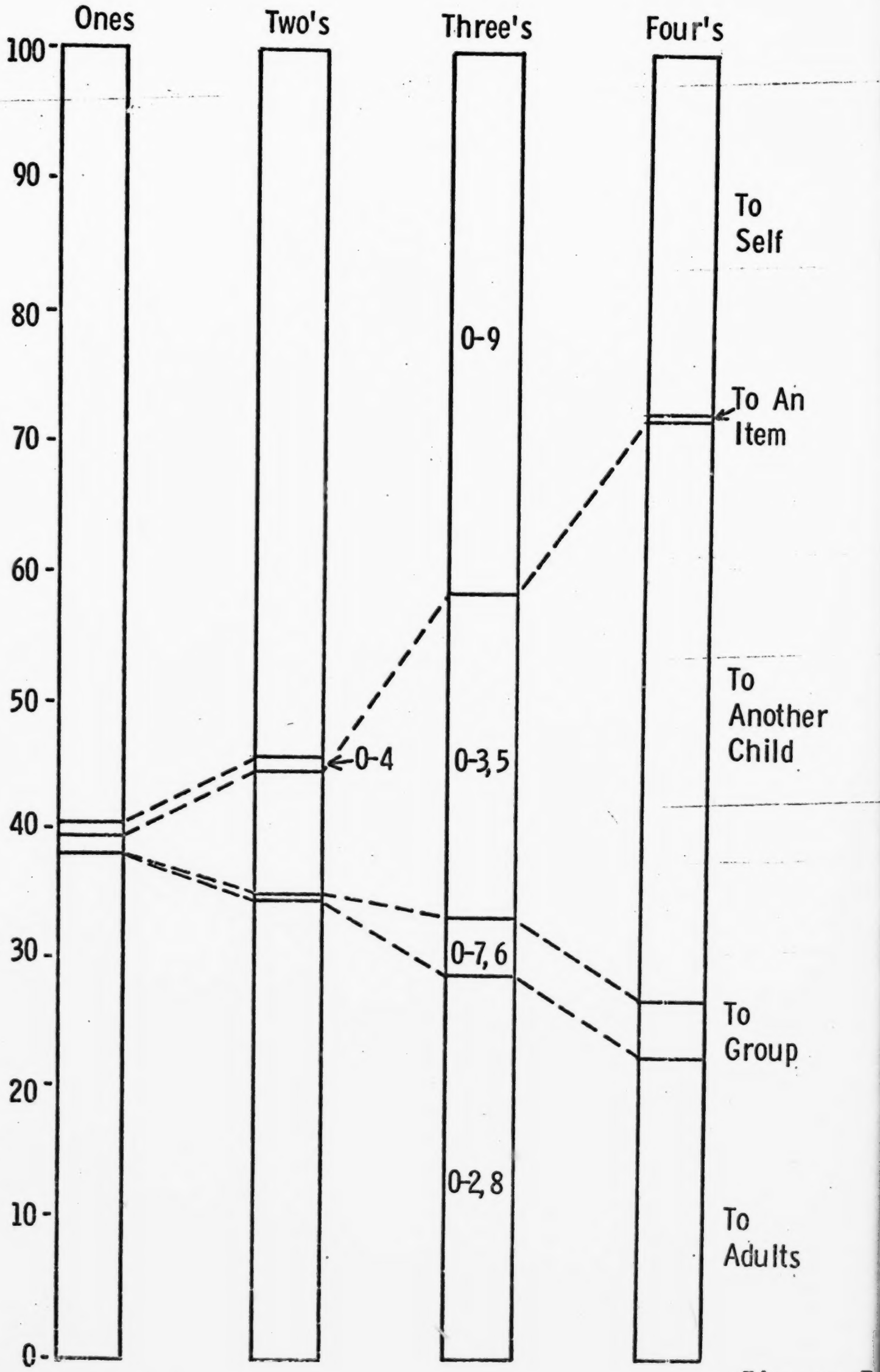


Figure 7